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[Document title] Specifications

[Title of the Invention] An Endermic Liniment

[Scope of the Claim]

[Claim 1] An endermic liniment comprising  
5 antibacterial zeolite and trisalt  
ethylenediaminehydroxyethyl triacetate.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

10 The present invention relates to an endermic  
liniment. More specifically, the present  
invention relates to an endermic liniment  
containing antibacterial zeolite that has superior  
anti-discoloring properties.

15 [0002]

[Conventional Technology]

Antibacterial zeolite is blended into  
endermic liniments including cosmetics and quasi-  
drugs as a preservative and/or odor eliminating  
20 agent.

For example, a composition for antibacterial  
sprays (see Patent Document 1) and deodorizing  
cosmetics (see Patent Document 2) containing  
antibacterial zeolite have been developed. Also,  
25 technology that blends silicone into antibacterial

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zeolite as a deodorizing cosmetic with improved  
anti-discoloring properties has been disclosed  
(see Patent Document 3).

[Patent Document 1]

5 Japanese Patent Laid-Open No. S63-250325 bulletin

[Patent Document 2]

Japanese Patent Laid-Open No. H8-26956 bulletin

[Patent Document 3]

Japanese Patent Laid-Open No. H8-92051 bulletin

10 [0003]

[Problem that the present invention aims to solve]

Antibacterial zeolite by itself is a stable  
ingredient for an endermic liniment. However,  
blending antibacterial zeolite into an endermic

15 liniment sometimes causes discoloration.

[0004]

The cause of this discoloration is not  
clear; there are many raw materials in an endermic  
liniment and reactions with such raw materials or  
20 their impurities are believed to cause subtle  
discoloration.

[0005]

For example, the inventors verified that  
blending antibacterial zeolite as a preservative  
25 or odor eliminating agent in an antiperspirant

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cosmetic containing aluminum hydroxychloride  
causes discoloration that is not preferable for  
the cosmetic's appearance. Also, the inventors  
verified that blending antibacterial zeolite in an  
5 endermic liniment containing various surfactants  
results in undesirable discoloration.

[0006]

In view of the aforementioned problem, the  
inventors conducted earnest research and amazingly  
10 discovered that trisalt  
ethylenediaminehydroxyethyl triacetate has an  
anti-discoloration effect on antibacterial zeolite  
in endermic liniments and thus completed the  
present invention.

15 [0007]

The object of the present invention is to  
provide an endermic liniment containing  
antibacterial zeolite that has the superb effect  
of preventing discoloration of endermic liniments  
20 and/or reducing the degree of discoloration.

[0008]

[Means to solve the Problem]

That is, the present invention provides an  
endermic liniment comprising antibacterial zeolite  
25 and trisalt ethylenediaminehydroxyethyl triacetate.

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[0009]

[The embodiments of the present invention]

The present invention is described in detail below.

5 [0010]

The antibacterial zeolite used in the present invention is zeolite that holds antibacterial metal ions in its ion-exchangeable parts. i.e. zeolite whose exchangeable ions are  
10 partly or entirely replaced by antibacterial metal ions. In the present invention, zeolite having ammonium ion substitution in addition to antibacterial zeolite ion substitution is also preferable.

15 [0011]

For the zeolite, either natural zeolite or synthetic zeolite can be used. Zeolite is aluminosilicate having a three dimensional skeletal structure; it is represented by the  
20 general formula  $XM_{2/n}O \cdot Al_2O_3 \cdot YSiO_2 \cdot ZH_2O$ . In this general formula, M denotes an exchangeable ion, usually a monovalent or divalent metal ion. n denotes the atomic valence of the (metal) ion. X and Y denote metal oxide and the silica factor,  
25 respectively, and Z denotes the number of the

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crystallization water molecules.

[0012]

Specific examples of zeolite include A-type zeolite, X-type zeolite, Y-zeolite, T-type, high silica zeolite, sodalite, mordenite, analcime, crinoptyrolite, chabasite, and erionite. The ion exchange capacity of these zeolites are: 7 meq/g for A-type zeolite, 6.4 meq/g for X-type zeolite, 5 meq/g for Y-zeolite, 3.4 meq/g for T-type, 11.5 meq/g for sodalite, 2.6 meq/g for mordenite, 5 meq/g for analcime, 2.6 meq/g for crinoptyrolite, 5 meq/g for chabasite, and 3.8 meq/g for erionite. Any of these has enough capacity for ion exchange with antibacterial metal ions and/or ammonium ions.

15 [0013]

Examples of exchangeable ions in zeolite include sodium ions, calcium ions, potassium ions, magnesium ions, and iron ions. Examples of the antibacterial metal ions to substitute for these ions include silver, copper, zinc, mercury, tin, lead, bismuth, cadmium, chromium, and thallium ions; preferably silver, copper, or zinc ions, and more preferably silver ions.

[0014]

25 The content of the antibacterial ions is

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preferably 0.1-15 mass % of the zeolite. For example, antibacterial zeolite containing 0.1-15% of silver ion and 0.1-8 mass % of copper ion or zinc ion is preferable. On the other hand, zeolite can contain up to 20 mass % of ammonium ions; however, for the purpose of effectively preventing discoloration of the zeolite, 0.5-5% is preferable and 0.5-2 mass % is more preferable.

"Mass %" means the mass percentage in 110°C dry standard zeolite.

[0015]

In the present invention, commercial products can be used for the antibacterial zeolite; the antibacterial zeolite can also be prepared by the following method, for example. That is, zeolite is exposed to a mixed solution containing antibacterial metal ions such as silver ions, copper ions, and zinc ions, prepared in advance, to substitute the aforementioned ions for the exchangeable ions in the zeolite. The exposure can be achieved by the batch method or continuous method (column method, for example) for 3-24 hours, preferably 10-24 hours, at 10-70°C, preferably 40-60°C. The pH of the aforementioned mixed solution should be adjusted to 3-10,

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preferably 5-7. This adjustment is preferable because it prevents precipitation of silver oxide and such on the zeolite surface or in the fine pores. Each ion in the mixed aqueous solution is usually supplied in the form of a salt. For example, silver ions are from silver nitrate, silver sulfate, silver perchlorate, diamminesilver nitrate, diamminesilver sulfate, etc.; copper ions are from copper nitrate (II), copper perchlorate, copper acetate, potassium tetracyanocuprate, copper sulfate, etc.; zinc ions are from zinc nitrate (II), zinc sulfate, zinc perchlorate, zinc thiocyanate, zinc acetate, etc.; mercury ions are from mercury perchlorate, mercury nitrate, and mercury acetate; tin ions are from tin sulfate and such; lead ions are from lead sulfate, lead nitrate, etc.; bismuth ions are from bismuth chloride, bismuth iodide, etc.; cadmium ions are from cadmium perchlorate, cadmium sulfate, cadmium nitrate, and cadmium acetate; chromium ions are from chromium perchlorate, chromium sulfate, chromium ammonium sulfate, chromium nitrate, etc.; thallium ions are from thallium perchlorate, thallium sulfate, thallium nitrate, thallium acetate, etc.

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[0016]

The antibacterial metal ion content in the zeolite can be controlled by adjusting the concentration of each ion (salt) in said mixed aqueous solution. For example, in the case of antibacterial zeolite containing silver ions, an antibacterial zeolite with a silver ion content of 0.1-5% can be obtained by adjusting the silver ion concentration in said mixed aqueous solution to 0.002M/l-0.15M/l. In the case of antibacterial zeolite additionally containing copper ions and zinc ions, an antibacterial zeolite with a copper ion content of 0.1-8% and a zinc ion content of 0.1-8% can be obtained by adjusting the silver ion concentration to 0.1M/l-0.85M/l and the zinc ion concentration to 0.15M/l-1.2M/l in said mixed aqueous solution. For ion exchange of antibacterial zeolite, it is also possible to use solutions, each of which contains each ion, and expose the zeolite with these solutions one after another. The concentration of each ion in each aqueous solution can be determined based on the concentration of each ion in said mixed aqueous solution.

25 [0017]

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After the completion of the ion exchange, the zeolite is thoroughly rinsed and then dried. The drying is preferably done at 105°C-115°C, or under a reduced pressure (1-30 Torr) at 70-90°C.

5 [0018]

Ion exchange for organic ions and/or for ions for which there isn't an adequate water soluble salt, such as tin and bismuth, can be done by using an organic solvent solution such as an alcohol or acetone to prevent precipitation of slightly soluble basic salts.

[0019]

The blend ratio of the antibacterial zeolite in the endermic liniment is not limited in particular. It is determined based on the reason why the antibacterial zeolite is added and also on the product form of the endermic liniment.

For example, when blended in as a preservative, the blend ratio is usually 0.05-10 mass % of the total amount of the endermic liniment. As another example, when blended in as a bactericide, the blend ratio is usually 0.1-90 mass % of the total amount of the endermic liniment, depending on the product form. For example, for lotion or cream type endermic

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liniments 0.1-20 mass % of the total amount of the endermic liniment is preferable; for powder type endermic liniments 0.5-80 mass % of the total amount of the endermic liniment is preferable; for  
5 stick type endermic liniments 0.5-60 mass % of the total amount of the endermic liniment is preferable; and for spray type endermic liniments 0.5-50 mass % of the total amount of the endermic liniment is preferable.

10 [0020]

The trisalt ethylenediaminehydroxyethyl triacetate used in the present invention, as a chelating agent, is a prior art ingredient of an endermic liniment. Examples of the salt include  
15 alkali metal salts such as sodium and potassium; sodium salt is preferable. Commercial products such as Clewat OH-300 (Teikoku Kagaku Sangyo Co., Ltd.) are used. Dry powder of trisalt ethylenediaminehydroxyethyl triacetate is blended  
20 into the endermic liniment of the present invention usually in the form of trihydrate.

[0021]

In the present invention, trisalt ethylenediaminehydroxyethyl triacetate  
25 specifically acts as an anti-discoloration agent

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for an endermic liniment containing antibacterial zeolite. EDTA-3Na and such, which are well known as a chelating agent and have a chemical structure similar to that of trisalt

5 ethylenediaminehydroxyethyl triacetat such as trisodium ethylenediaminehydroxyethyl triacetate, do not have the anti-discoloration effect for endermic liniments.

[0022]

10 The blend ratio of the trisalt ethylenediaminehydroxyethyl triacetate is determined based on the blend ratio of the antibacterial zeolite and the product form. It is usually 0.01-5 mass % (unhydrated equivalent) of  
15 the total amount of the skin treatment composition.

[0023]

When using the endermic liniment of the present invention for applications such as odor eliminating agents and antiperspirant cosmetics,  
20 it is preferable to blend in an aluminum compound that is an antiperspirant.

[0024]

In addition to the aforementioned essential ingredients, other ingredients commonly used in  
25 endermic liniments, for example one, two or more

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of those listed below, are blended as necessary in the endermic liniment of the present invention; the preparation can be conducted for the target formulation with a conventional method.

5 [0025]

Examples of the powder ingredients include inorganic powders (for example, talc, kaolin, mica, sericite, muscovite, phlogopite, synthetic mica, lepidolite, biotite, vermiculite, magnesium  
10 carbonate, calcium carbonate, aluminum silicate, barium silicate, calcium silicate, magnesium silicate, strontium silicate, tungstic acid metal salt, magnesium, silica, barium sulfate, firing calcium sulfate (calcined gypsum), calcium  
15 phosphate, fluorine-apatite, hydroxy apatite, ceramic powder, metallic soaps (for example, zinc myristate, calcium palmitate, and aluminum stearate), and boron nitride); organic powders (for example, polyamide resin powder (nylon  
20 powder), polyethylene powder, poly methyl methacrylate powder, benzoguanamine resin powder, polytetrafluoroethylene powder, and cellulose powder); inorganic white pigments (for example, titanium dioxide and zinc oxide); inorganic red  
25 pigments (for example, iron oxide (red iron oxide))

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and iron titanate); inorganic brown pigments (for example,  $\gamma$ -iron oxide); inorganic yellow pigments (for example, yellow iron oxide and loess); inorganic black pigments (for example, black iron oxide and low oxides of titanium); inorganic purple pigments (for example, manganese violet, cobalt violet); inorganic green pigments (for example, chromium oxide, chromium hydroxide, and cobalt titanate); inorganic blue pigments (for example, ultramarine blue and Berlin blue); pearl pigment (for example, titania coated mica, titania coated bismuth oxychloride, titania coated talc, coloration titania coated mica, bismuth oxychloride, fish scale flakes); metal powder pigments (for example, aluminum powder, copper powder); organic pigments such as Zr, barium or aluminum lake (for example, organic pigments such as red 201, red 202, red 204, red 205, red 220, red 226, red 228, red 405, orange 203, orange 204, yellow 205, yellow 401 and blue 404, as well as red 3, red 104, red 106, red 227, red 230, red 401, red 505, orange 205, yellow 4, yellow 5, yellow 202, yellow 203, green 3 and blue 1; and natural colors (for example, chlorophyll and  $\beta$ -carotene).

[0026]

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Examples of the liquid fats and oils include  
avocado oil, tsubaki oil, turtle fatty acid,  
macademia nut oil, corn oil, mink oil, olive oil,  
rapeseed oil, egg yolk oil, sesame oil, persic oil,  
5 wheat germ oil, sasanqua oil, castor oil, linseed  
oil, safflower oil, cotton seed oil, perilla oil,  
soybean oil, peanut oil, tea seed oil, Japanese  
nutmeg oil, rice bran oil, Chinese gimlet oil,  
Japan gimlet oil, jojoba oil, germ oil, and  
10 triglycerin.

[0027]

Examples of the solid fats and oils include  
cacao butter, coconut oil, hydrogenated coconut  
oil, palm oil, palm kernel oil, Japanese core wax  
15 nucleus oil, hydrogenated oil, Japanese core wax,  
and hydrogenated castor oil.

[0028]

Examples of the waxes include beeswax,  
candelilla wax, cotton wax, carnauba wax, bayberry  
20 wax, tree wax, whale wax, montan wax, bran wax,  
lanolin, kapok wax, lanolin acetate, liquid  
lanolin, sugar cane wax, lanolin fatty acid  
isopropyl ester, hexyl laurate, reduced lanolin,  
jojoba wax, hard lanolin, shellac wax, POE lanolin  
25 alcohol ether, POE lanolin alcohol acetate, POE

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cholesterol ether, lanolin fatty acid polyethylene glycol, POE hydrogenated lanolin ethyl alcohol ether, ceresin, and microcrystalline wax.

[0029]

5        Examples of the hydrocarbon oils include liquid petrolatum, ozocerite, squalane, pristane, paraffin, squalene, and petrolatum.

[0030]

10       Examples of the higher fatty acids include lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, oleic acid, undecylenic acid, isostearic acid, linolic acid, linoleic acid, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA).

15       [0031]

20       Examples of the higher alcohols include straight chain alcohols (for example, lauryl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol, myristyl alcohol, oleyl alcohol, and cetostearyl alcohol) and branched chain ethyl alcohols (for example, mono stearyl glycerin ether (batyl alcohol), 2-decyltetradecynol, lanolin alcohol, cholesterol, phytosterol, hexyl dodecanol, iso stearyl alcohol, and octyl dodecanol).

25       [0032]

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Examples of the ester oils include isopropyl myristate, cetyl octanoate, octyl dodecyl myristate, isopropyl palmitate, butyl stearate, hexyl laurate, myristil myristate, decyl oleate, 5 dimethyl hexyl decyl octanoate, cetyl lactate, myristil lactate, lanolin acetate, iso cetyl stearate, iso cetyl isostearate, cholesteryl hydroxy 12-stearate, di-2-ethylene glycol ethylhexanoate, dipentaerythritol fatty acid ester, 10 n-alkylene glycol monoisostearate, neopentyl glycol dicaprate, diisostearyl malate, glyceryl di-2-heptylundecanoate, trimethylolpropane tri-2-ethylhexanoate, trimethylolpropane triisostearate, tetra-2-pentaerythritol ethylhexanoate, glycerin, 15 tri-2-ethylhexanoate, glyceryl trioctanoate, glycerin triisopalmitate, trimethylolpropane triisostearate, cetyl 2-ethyl hexanoate, 2-ethylhexyl palmitate, glycerin trimyristate, tri-2-heptyl undecanoic acid glyceride, methyl castor 20 oil fatty acid, oleyl oleate, aceto glyceride, 2-heptyl undecyl palmitate, diisobutyl adipate, 2-octyldodecyl N-lauroyl-L-glutamate, di-2-heptyl undecyl adipate, ethyl laurate, di-2-ethylhexyl sebacate, 2-hexyl decyl myristate, 2-hexyl decyl 25 palmitate, 2-hexyl decyl adipate, diisopropyl

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sebacate, 2-ethylhexyl succinate, and triethyl  
citrate.

[0033]

Examples of the silicone oils include chain  
5 polysiloxanes (for example, dimethylpolysiloxane,  
methylphenyl polysiloxane, and diphenyl  
polysiloxane); ring polysiloxanes (for example,  
octamethylcyclotetrasiloxane, decamethyl  
cyclopenta siloxane, and dodecamethyl cyclohexa  
10 siloxane), silicone resins forming a three-  
dimensional network structure, silicone rubbers,  
and various modified polysiloxanes (amino-modified  
polysiloxane, polyether-modified polysiloxane,  
alkyl-modified polysiloxane, and andfluorine-  
15 modified polysiloxane).

[0034]

Examples of the anionic surfactants include  
fatty acid soaps (for example, sodium laurate and  
sodium palmitate); higher alkyl sulfuric ester  
20 salts (for example, sodium lauryl sulfate and  
potassium laurylsulfate); alkylether sulfuric  
ester salts (for example, POE-triethanolamine  
laurylsulfate and sodium POE-lauryl sulfate); N-  
acyl sarcosinic acids (for example, sodium N-  
25 lauroyl sarcosinate); higher fatty acid ester

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sulfates (for example, hydrogenated coconut oil aliphatic acid glycerin sodium sulfate); N-acyl glutamates (for example, mono sodium N-lauroylglutamate, disodium N-stearoylglutamate, and sodium N-myristoyl-L-glutamate); sulfated oils (for example, turkey red oil); POE-alkylether carboxylic acid; POE-alkylarylether carboxylate;  $\alpha$ -olefin sulfonate; higher fatty acid ester sulfonates; sec-alcohol sulfates; higher fatty acid alkyl amide sulfates; sodium lauroyl monoethanolamine succinates; ditriethanolamine N-palmitoylaspartate; and sodium caseinate.

[0035]

Examples of the cationic surfactants include alkyltrimethylammonium salts (for example, stearyltrimethyl ammonium chloride and lauryltrimethyl ammonium chloride) alkylpyridinium salts (for example, cetylpyridinium chloride), distearyldimethylammonium chloride dialkyldimethylammonium salt; poly (N,N'-dimethyl-3,5-methylene piperidinium) chloride; alkyl quaternary ammonium salts; alkyl dimethylbenzyl ammonium salts; alkyl isoquinolinium salts; dialkylmorpholine salts; POE alkyl amines; alkyl amine salts; polyamine fatty acid derivatives;

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amylalcohol fatty acid derivatives; benzalkonium chloride; and benzethonium chloride.

[0036]

Examples of the ampholytic surfactants

5 include: imidazoline type ampholytic surfactants (for example, 2-undecyl-N,N,N-(hydroxyethyl carboxymethyl)-2-imidazoline sodium salt and 2-coco yl-2-imidazolinium hydroxide-1-carboxyethyloxy 2 sodium salt); and betaine type  
10 surfactants (for example, 2-heptadecyl-n-carboxymethyl-n-hydroxyethyl imidazolinium betaine, lauryldimethylaminoacetic acid betaine, alkyl betaine, amide betaine, and sulfobetaine).

[0037]

15 Examples of the lipophilic nonionic surface active agent include sorbitan fatty acid esters (for example, sorbitan mono oleate, sorbitan mono isostearate, sorbitan mono laurate, sorbitan mono palmitate, sorbitan mono stearate, sorbitan sesqui  
20 oleate, sorbitan trioleate, diglycerol sorbitan penta-2-ethylhexylate, diglycerol sorbitan tetra-2-ethylhexylate); glycerin polyglycerin aliphatic acids (for example, mono-cottonseed oil fatty acid glycerin, glyceryl monoerucate, glycerin  
25 sesquioleate, glyceryl monostearate,  $\alpha, \alpha'$ -

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glyceryl oleate pyroglutamate, glyceryl mono  
stearate mono malate); propylene glycol fatty  
acid esters (for example, propylene glycol  
monostearate); hydrogenated castor oil  
5 derivatives; and glycerin alkylethers.

[0038]

Examples of the hydrophilic nonionic surface  
active agents include: POE-sorbitan fatty acid  
esters (for example, POE-sorbitan monooleate, POE-  
10 sorbitan monostearate, POE-sorbitan monooleate, and  
POE-sorbitan tetraoleate); POE sorbitol fatty acid  
esters (for example, POE sorbitol monolaurate,  
POE-sorbitol monooleate, POE-sorbitolpentaoleate,  
and POE-sorbitol monostearate); POE-glycerin fatty  
15 acid esters (for example, POE-monooleates such as  
POE-glycerin monostearate, POE-glycerin  
monoisostearate, and POE-glycerin triisostearate);  
POE-fatty acid esters (for example, POE-distearate,  
POE-monodioleate, and ethylene glycol distearate);  
20 POE-alkylethers (for example, POE-lauryl ether,  
POE-oleyl ether, POE-stearyl ether, POE-behenyl  
ether, POE-2-octyl dodecyl ether, and POE-  
cholestanol ether); POE/POP-alkylethers (for  
example, POE/POP-cetyl ether, POE/POP-2-decyl  
25 tetradecyl ether, POE/POP-monobutyl ether,

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POE/POP-lanolin hydrate, and POE/POP-glycerin ether); POE-castor oil hydrogenated castor oil derivatives (for example, POE-castor oil, POE-hydrogenated castor oil, POE-hydrogenated castor oil monoisostearate, POE-hydrogenated castor oil triisostearate, POE-hydrogenated castor oil monopyroglutamic monoisostearic diester, and POE-hydrogenated castor oil maleic acid); POE-beeswax/lanolin derivatives (for example, POE-sorbitol beeswax); alkanol amides (for example, coconut fatty acid diethanol amide, lauric acid monoethanol amide, and aliphatic acid isopropanol amide); POE-propylene glycol fatty acid esters; POE-alkyl amine; POE-fatty acid amide; sucrose fatty acid ester; alkyl ethoxy dimethylamine oxides; and trioleyl phosphoric acid.

[0039]

Examples of the humectant include polyethylene glycol, propylene glycol, glycerin, 1,3-butylene glycol, xylitol, sorbitol, maltitol, chondroitin sulfate, hyaluronic acid, mucoitin sulfuric acid, charonic acid, atelocollagen, cholesteryl-12-hydroxy stearate, sodium lactate, bile salt, dl-pyrrolidone carboxylic acid salt, short chain soluble collagen, diglycerin (EO)PO

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adduct, chestnut rose fruit extract, yarrow  
extract, and sweet clover extract.

[0040]

Examples of the natural water-soluble

5 polymer include: plant-type polymers {for example,  
gum arabic, gum tragacanth, galactan, guar gum,  
carob gum, karaya gum, carrageenan, pectin, agar,  
quince seed (*Cydonia oblonga*), algae colloids  
(brown algae extract), starches (rice, corn,  
10 potato, and wheat), and glycyrrhizic acid};  
microorganism-type polymers (for example, xanthan  
gum, dextran, succinoglucan, and pullulan); and  
others (for example, fish-derived collagen, fish-  
derived gelatin, wheat protein, and silk proten).

15 [0041]

Examples of the semisynthetic water-soluble  
polymers include: starch-type polymers (for  
example, carboxymethyl starch and  
methylhydroxypropyl starch); cellulosic polymers  
20 (for example, methyl cellulose, ethyl cellulose,  
methylhydroxypropyl cellulose, hydroxyethyl  
cellulose, cellulose sodium sulfate, hydroxypropyl  
cellulose, carboxymethyl-cellulose, sodium  
carboxymethyl cellulose, crystal cellulose, and  
25 cellulose powder); and alginic acid-type polymers

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(for example, sodium alginate and propyleneglycol alginate).

[0042]

Examples of the synthetic water-soluble  
5 polymers include: vinyl polymers (for example, polyvinyl alcohol, polyvinyl methyl ether, polyvinylpyrrolidone, carboxy vinyl polymer); polyoxyethylene-type polymers (for example, a copolymer of polyethylene glycol 20,000, 40,000,  
10 or 60,000 and polyoxyethylene polyoxypropylene); acrylic polymers (for example, sodium polyacrylate, polyethylacrylate, and polyacrylamide); polyethyleneimine; and cationic polymers.

[0043]

15 Examples of the thickeners include: gum arabic, carrageenan, karaya gum, gum tragacanth, carob gum, quince seed (Cydonia oblonga), casein, dextrin, gelatin, sodium pectate, sodium arginate, methyl cellulose, ethyl cellulose, CMC, hydroxy  
20 ethyl cellulose, hydroxypropyl cellulose, PVA, PVM, PVP, sodium polyacrylate, carboxy vinyl polymer, locust bean gum, guar gum, tamarind gum, cellulose dialkyl dimethylammonium sulfate, xanthan gum, aluminum magnesium silicate,  
25 bentonite, hectorite, AlMg silicate (beagum),

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laponite, and silicic acid anhydride.

[0044]

Examples of the ultraviolet absorbents include the following compounds.

5 (1) Benzoic acid-type ultraviolet absorbents

For example, p-aminobenzoic acid (hereafter abbreviated as PABA), PABA monoglycerin ester, N,N-dipropoxy PABA ethyl ester, N,N-diethoxy PABA ethyl ester, N,N-dimethyl PABA ethyl ester, N,N-  
10 dimethyl PABA butyl ester, and N,N-dimethyl PABA ethyl ester.

(2) Anthranilic acid-type ultraviolet absorbents

For example, homo mentyl-N-acetyl anthranilate.

15 (3) Salicylic acid-type ultraviolet absorbents

For example, amyl salicylate, mentyl salicylate, homo mentyl salicylate, octyl salicylate, phenyl salicylate, benzil salicylate, and p-isopropanol phenyl salicylate.

20 (4) Cinnamic acid-type ultraviolet absorbents

For example, octyl cinnamate, ethyl-4-isopropyl cinnamate, methyl-2,5-diisopropyl cinnamate, ethyl-2,4-diisopropyl cinnamate, methyl-2,4-diisopropyl cinnamate, propyl-p-methoxy  
25 cinnamate, isopropyl-p-methoxy cinnamate, isoamyl-

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p-methoxy cinnamate, octyl-p-methoxy cinnamate (2-ethylhexyl-p-methoxy cinnamate), 2-ethoxyethyl-p-methoxy cinnamate, cyclohexyl-p-methoxy cinnamate, ethyl- $\alpha$ -cyano- $\beta$ -phenyl cinnamate, 2-ethylhexyl- $\alpha$ -cyano- $\beta$ -phenyl cinnamate, and glyceryl mono-2-ethyl hexanoyl-di-p-methoxy cinnamate.

## (5) Triazine-type ultraviolet absorbents

For example, bisresorsinyl triazine.

More specifically, bis{[4-(2-ethylhexyloxy)-2-hydroxy]phenyl}-6-(4-methoxyphenyl) 1,3,5-triazine, 2,4,6-tris {4-(2-ethylhexyloxycarbonyl)anilino}1,3,5-triazine, etc.

## (6) Other ultraviolet absorbents

For example, 3-(4'-methylbenzylidene)-d,l-camphor, 3-benzylidene-d,l-camphor, 2-phenyl-5-methyl benzoxazol, 2-(2'-hydroxy-5'-methylphenyl) benzotriazol, 2-(2'-hydroxy-5'-t-octylphenyl) benzotriazol, 2-(2'-hydroxy-5'-methylphenyl) benzotriazol, dibenzaladine, dianisoylmethane, and 4-methoxy-4'-t-butyl dibenzoyl-methane, 5-(3,3-dimethyl-2-norbornylidene)-3-pentane-2-one. Pyridazinone derivatives such as dimorpholino pyridazine.

[0045]

Examples of the sequestering agents include:

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1-hydroxy ethane-1,1-diphosphonic acid, 1-hydroxy  
ethane-1,1-diphosphonic acid tetrasodium salt,  
disodium edetate, trisodium edetate, tetrasodium  
edetate, sodium citrate, sodium polyphosphate,  
5 sodium metaphosphate, gluconic acid, phosphoric  
acid, citric acid, ascorbic acid, and succinic  
acid.

[0046]

Examples of the lower alcohols include  
10 ethanol, propanol, isopropanol, isobutanol, and t-  
butyl alcohol.

[0047]

Examples of the polyhydric alcohols include:  
dihydric alcohols (for example, ethylene glycol,  
15 propylene glycol, trimethylene glycol, 1,2-  
butylene glycol, 1,3-butylene glycol,  
tetramethylene glycol, 2,3-butylene glycol,  
pentamethylene glycol, 2-butene-1,4-diol, hexylene  
glycol, and octylene glycol); trihydric alcohols  
20 (for example, glycerin and trimethylolpropane);  
tetrahydric alcohols (for example, pentaerythritol  
such as 1,2,6-hexanetriol); pentahydric alcohols  
(for example, xylitol); hexahydric alcohols (for  
example, sorbitol, mannitol); polyhydric alcohol  
25 polymers (for example, diethylene glycol,

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dipropylene glycol, triethylene glycol,  
polypropylene glycol, tetraethylene glycol,  
diglycerin, polyethylene glycol, triglycerin,  
tetraglycerin, and polyglycerin); dihydric alcohol  
5 alkylethers (for example, ethylene glycol  
monomethyl ether, ethylene glycol monoethyl ether,  
ethylene glycol monobutyl ether, ethylene glycol  
monophenyl ether, ethylene glycol monohexyl ether,  
ethylene glycol mono 2-methyl hexyl ether,  
10 ethylene glycol isoamyl ether, ethylene glycol  
benzyl ether, ethylene glycol isopropyl ether,  
ethylene glycol dimethylether, ethylene glycol  
diethyl ether, and ethylene glycol dibutyl ether);  
dihydric alcohol ether esters (for example,  
15 ethylene glycol monomethyl ether acetate, ethylene  
glycol monoethyl ether acetate, ethylene glycol  
monobutyl ether acetate, ethylene glycol  
monophenyl ether acetate, ethylene glycol  
diadipate, ethylene glycol disuccinate, diethylene  
20 glycol monoethyl ether acetate, diethylene glycol  
monobutyl ether acetate, propylene  
glycolmonomethyl ether acetate, propylene glycol  
monoethyl ether acetate, propylene glycol  
monopropyl ether acetate, and propylene glycol  
25 monophenyl ether acetate); glycerin mono alkyl

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ethers (for example, xylyl alcohol, selachyl alcohol, and batyl alcohol); sugar alcohols (for example, sorbitol, maltitol, maltotriose, mannitol, sucrose, erythritol, glucose, fructose, starch amyloolysis sugar, maltose, xylitose, and alcohol prepared by the reduction of starch amyloolysis sugar); glysolid; tetrahydro furfuryl alcohol; POE-tetrahydro furfuryl alcohol; POP-butyl ether; POP/POE-butyl ether; tripolyoxypropylene glycerin ether; POP-glycerin ether, POP-glycerin ether phosphoric acid; POP/POE-pentane erythritol ether, and polyglycerin.

[0048]

Examples of the monosaccharides include:

trioses (for example, D-glyceryl aldehyde and dihydroxyacetone); tetroses (for example, D-erythrose, D-erythrulose, D-threose, and erythritol); pentoses (for example, L-arabinose, D-xylose, L-lyxose, D-arabinose, D-ribose, D-ribulose, D-xylulose, and L-xylulose); hexoses (for example, D-glucose, D-talose, D-psicose, D-galactose, D-fructose, L-galactose, L-mannose, and D-tagatose); heptoses (for example, aldoheptose and heptose); octoses (for example, octulose); deoxysugars (for example, 2-deoxy-D-ribose, 6-

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deoxy-L-galactose, and 6-deoxy-L-mannose); amino  
sugars (for example, D-glucosamine, D-  
galactosamine, sialic acid, amino uronic acid, and  
muramic acid); and uronic acid (for example, D-  
5 glucuronic acid, D-mannuronic acid, L-guluronic  
acid, D-galacturonic acid, and L-iduronic acid).

[0049]

Examples of the oligosaccharides include  
sucrose, umbelliferose, lactose, planteose,  
10 isolignoses,  $\alpha, \alpha$ -trehalose, raffinose, lignoses,  
umbilicine, stachyose and verbascose.

[0050]

Examples of the polysaccharides include  
cellulose, quince seed, chondroitin sulfate,  
15 starch, galactan, dermatan sulfate, glycogen, gum  
arabic, heparan sulfate, hyaluronic acid, traganth  
gum, keratan sulfate, chondroitin, xanthan gum,  
mucoitin sulfuric acid, guar gum, dextran, kerato  
sulfate, locustbean gum, succinoglucane, and  
20 charonic acid.

[0051]

Examples of the amino acids include neutral  
amino acids (for example, threonine and cysteine)  
and basic amino acids (for example, hydroxylysine).  
25 Examples of the amino acid derivatives include

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sodium acyl sarcosinate (sodium N-lauroyl sarcosinate), acyl glutamate, acyl  $\beta$ -alanine sodium, glutathione, and pyrrolidone carboxylic acid.

5 [0052]

Examples of the organic amines include monoethanolamine, diethanolamine, triethanolamine, morpholine, triisopropanolamine, 2-amino-2-carbinyl-1,3-propanediol, and 2-amino-2-carbinyl-  
10 1-propanol.

[0053]

Examples of the high polymer emulsions include acrylic resin emulsions, ethyl polyacrylate emulsions, acryl resin liquids,  
15 polyacrylic alkyl ester emulsions, polyvinyl acetate resin emulsions, and natural rubber latex.

[0054]

Examples of the pH adjustment agents include buffers such as lactic acid-sodium lactate, citric  
20 acid-sodium citrate, and succinic acid-sodium succinate.

[0055]

Examples of the vitamins include vitamins A, B1, B2, B6, C and E as well as their derivatives,  
25 pantothenic acid and its derivatives, and biotin.

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[0056]

Examples of the antioxidants include tocopherols, dibutyl hydroxytoluene, butyl hydroxyanisole, and gallic ester.

5 [0057]

Examples of the antioxidation auxiliary agents include phosphoric acid, citric acid, ascorbic acid, maleic acid, malonic acid, succinic acid, fumaric acid, cephalin, hexameta phosphate, phytic acid, and ethylene diamine tetraacetic acid.

[0058]

Examples of other possible ingredients include antiseptics (methylparaben, ethylparaben, butylparaben, and phenoxyethanol); anti-inflammatory agents (for example, glycyrrhizic acid derivatives, glycyrrhetinic acid derivatives, salicylic acid derivatives, hinokitiol, zinc oxide, and allantoin); whitening agents (for example, creeping saxifrage extract, arbutin, tranexamic acid, L-ascorbic acid, magnesium L-ascorbyl phosphate, L-ascorbic acid glucoside, and potassium 4-methoxysalicylate); various extracts (for example, Phellodendri Cortex, goldthread, lithospermum root, Paeonia lactiflora, Swertia japonica, Birch, sage, loquat, carrot, aloe, Malva

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sylvestris, Iris, grape, Coix ma-yuen, sponge  
gourd, lily, saffron, Cnidium officinale, sheng  
jiang, Hypericum erectum, Ononis, garlic, Guinea  
pepper, chen pi, Ligusticum acutilobum, and  
5 seaweed), activators (royal jelly, photosensitive  
substances, and cholesterol derivatives); blood  
circulation promoting agents (for example, nonyl  
acid valenyl amide, nicotinic acid benzyl esters,  
nicotinic acid  $\beta$ -butoxy ethyl esters, capsaicin,  
10 gingeron, cantharis tincture, Ichthammol, tannic  
acid,  $\alpha$ -borneol, tocopherol nicotinate, inositol  
hexanicotinate, cyclandelate, cinnarizine,  
tolazoline, acetylcholine, verapamil,  
cepharanthine, and  $\gamma$ -orizanol); anti-seborrhea  
15 agents (for example, sulfur and thiantol); and  
antiinflammatory agents (for example, thiotaurine  
and hypotaurine); and bactericides (for example,  
benzoic acid and its salts, isopropylmethyl phenol,  
undecylenic acid and its salts, undecylenic acid  
20 monoethanol amide, cetyltrimethyl ammonium  
chloride, cetylpyridinium chloride, benzalkonium  
chloride, benzethonium chloride,  
alkyldiaminoethylglycine chloride, chlorhexidine  
chloride, orthophenyl phenol, chlorhexidine  
25 gluconate, cresol, chloramine T, chlorxylenol,

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chlorcresol, chlorfenesis, chlorobutanol, 5-chloro-2-methyl-4-isothiazoline-3-one, salicylic acid and its salts, 1,3-dimethylol-5,5-dimethylhidantoin, alkylisoquinolium bromide, 5 domiphen bromide and its salt, sorbic acid and its salts, thymol, thylum, thiram, dehydroacetic acid and its salt, triclosan, trichlorocarbanilide, p-oxybenzoic ester, p-chlorphenol, halocarbon, pyrogallol, phenol, hexachlorophene, 2-methyl-4-10 isothiazoline-3-one, NN"-Methylenebis(N'-(3-hydroxymethyl-2,5-dioxo-4-imidazolidinyl)urea), sodium layroylsarcosine, and resorcin).

[0059]

[Examples]

15 The present invention is described in detail below by referring to Examples. The present invention is not limited to them. The blend ratios are in mass-percentage units unless specified otherwise.

20 [0060]

Recipes shown in Table 1 and Table 2 were used to prepare powder lotion-type antiperspirant lotions and the degree of discoloration was evaluated visually. For Comparative examples, a 25 recipe containing no trisodium

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ethylenediaminehydroxyethyl triacetate and a recipe containing a chelating agent  $\text{EDTA-3Na} \cdot 2\text{H}_2\text{O}$  instead of trisodium ethylenediaminehydroxyethyl triacetate were investigated. The degree of

5    discoloration was evaluated by giving ○ to those that are within the acceptable range for endermic liniment, and × to those that are outside of this range.

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[0061]

[Table 1]

	Examples			Comparative examples						
	1	2	3	1	2	3	4	5	6	7
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Ethanol (95%, synthesized)	50	50	50	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (Antiperspirant)	20	20	20	20	20	20	20	20	20	20
P0E (10) POP (20) decyltetradecyl ether (dispersing agent)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Anti-bacterial zeolite A (preservative)	1	1	1	1	1	1	1	1	1	1
Trisodium ethylenediaminehydroxy ethyl triacetate	0.1	0.05	0.01							
EDTA-3Na·2H <sub>2</sub> O					0.3	0.2	0.1	0.08	0.05	0.03
Total	100	100	100	100	100	100	100	100	100	100
Solution color	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent
Precipitation color	Light red	Light red	Light red	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple
Degree of discoloration (visual evaluation)	○	○	○	×	×	×	×	×	×	×

Antibacterial zeolite A: Zeolite containing silver ions and zinc ions (average particle size

5 approximately 1.5 micrometers)

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[Table 2]

	Examples			Comparative examples						
	4	5	6	8	9	10	11	12	13	14
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Ethanol (95% synthesized)	50	50	50	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (Antiperspirant)	20	20	20	20	20	20	20	20	20	20
PDE (10) POP (20) decyltetradecyl ether (dispersing agent)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Anti-bacterial zeolite B (preservative)	1	1	1	1	1	1	1	1	1	1
Trisodium ethylenediaminehydroxyethyl triacetate	0.1	0.05	0.01							
EDTA-3Na·2H <sub>2</sub> O					0.3	0.2	0.1	0.08	0.05	0.03
Total	100	100	100	100	100	100	100	100	100	100
Solution color	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent
Precipitation color	Light red	Light red	Light red	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple
Degree of discoloration (visual evaluation)	O	O	O	x	x	x	x	x	x	x

Antibacterial zeolite B: Zeolite containing silver ions, zinc ions, and ammonium ions (Zeomic AJ10N from Sinanen Zeomic Co., Ltd., average particle size approximately 1.5 micrometers)

[0062]

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The aforementioned results show that Comparative examples that do not contain trisodium ethylenediaminehydroxyethyl triacetate and Comparative examples that contain a chelating agent EDTA-3Na · 2H<sub>2</sub>O exhibit discoloration of precipitated white powder of antibacterial silver zeolite into gray/purple, resulting in a larger degree of discoloration.

On the other hand, Examples containing trisodium ethylenediaminehydroxyethyl triacetate exhibit only slight red discoloration of the precipitated antibacterial silver zeolite; and the degree of discoloration is very small and within the allowable range for endermic liniments; which indicates a superior antidiscoloration effect.

[0063]

Other Examples of the present invention are shown below.

[0064]

Example 7: Pressed powder	
Aluminum hydroxychloride	5 mass %
Zinc oxide (zinc flower)	5
Talc	76.99
Liquid petrolatum	3
Antibacterial zeolite B	10

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Trisodium ethylenediaminehydroxyethyl triacetate

0.01

[0065]

Example 8: Loose powder

5	Aluminum hydroxychloride	5 mass %
	Zinc oxide (zinc flower)	5
	Talc	79.99
	Antibacterial zeolite B	10
	Trisodium ethylenediaminehydroxyethyl triacetate	
10		0.01

[0066]

Example 9: Lotion-type spray

(Stock solution recipe)

	Purified water	10 mass %
15	Aluminum hydroxychloride	10
	Anhydrous ethyl alcohol	73.9
	Isopropyl myristate	2
	1,3-butylene glycol	3
	Antibacterial zeolite B	1
20	Trisodium ethylenediaminehydroxyethyl triacetate	
		0.1

(Filler recipe)

	Stock solution	50
	LPG	50

25 [0067]

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Example 10: Powder spray

Aluminum hydroxychloride 20 mass %

Silicic acid anhydride 15

Talc 20.21

5 Zinc oxide (zinc flower) 5

Isopropyl myristate 21.79

Dimethyl polysiloxane 10

Sorbitan fatty acid ester 3

Antibacterial zeolite B 5

10 Trisodium ethylenediaminehydroxyethyl triacetate  
0.1

(Filler recipe)

Stock solution 10

LPG 90

15 [0068]

Example 11: Powder spray

Aluminum hydroxychloride 20 mass %

Silicic acid anhydride 15

Talc 20.21

20 Zinc oxide (zinc flower) 5

Isopropyl myristate 21.79

Polyoxyethylene/polypropylene random polymer

methyl ether 10

Sorbitan fatty acid ester 3

25 Antibacterial zeolite B 5

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Trisodium ethylenediaminehydroxyethyl triacetate

0.1

(Filler recipe)

Stock solution 10

5 LPG 90

[0069]

Example 12: Stick

Aluminum hydroxychloride 20 mass %

Talc 7.9

10 Zinc oxide (zinc flower) 5

Solid petrolatum wax 2

Stearyl alcohol 8

Liquid petrolatum 15

Cyclic dimethyl polysiloxane 36

15 Sorbitan fatty acid ester 1

Antibacterial zeolite B 5

Trisodium ethylenediaminehydroxyethyl triacetate

0.1

[0070]

20 Example 13: Cream

Purified water 45 mass %

Squalane 20

Cyclic dimethyl polysiloxane 15

Glyceryl diisostearate 3

25 Diethoxyethyl succinate 5

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Organically modified montmorillonite

1.5

1,3-butylene glycol

5.49

Antibacterial zeolite A

5

5 Trisodium ethylenediaminehydroxyethyl triacetate

0.01

[0071]

Example 14: Emulsion

Purified water

20 mass %

10 Aluminum hydroxychloride

20

Octyl-p-methoxycinnamate

5

Oxybenzone

3

4-tert butyl-4'-methoxybenzoylmethane

1

15 Hydrophobically treated zinc oxide 5

Polyoxyethylene/polypropylene random polymer

methyl ether

10

Silicone oil

15

Silicone resin

1

20 Glyceryl diisostearate

1

Organically modified montmorillonite

0.5

1,3-butylene glycol

5.49

Antibacterial zeolite B

13

25 Trisodium ethylenediaminehydroxyethyl triacetate

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0.01

[0072]

## Example 15: Ointment

	Purified water	53.74 mass %
5	Aluminum hydroxychloride	20
	Glycerin	10
	1,3-butylene glycol	3
	Caustic potash	0.25
	Stearic acid	2
10	Stearic acid monoglyceride	2
	Cetanol	1
	Liquid petrolatum	5
	Petrolatum	2
	Antibacterial zeolite B	1
15	Trisodium ethylenediaminehydroxyethyl triacetate	0.01

[0073]

## Example 16: Gel

	Purified water	63.27 mass %
20	Aluminum hydroxychloride	20
	Dipropylene glycol	5
	PEG 1500	5.5
	Carboxyvinyl polymer	0.4
	Methylcellulose	0.2
25	POE(15) oleyl alcohol ether	0.5

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Potassium hydroxide	0.1
EDTA	0.02
Antibacterial zeolite B	5
Trisodium ethylenediaminehydroxyethyl triacetate	
5	0.01

## [0074]

Example 17: Wet sheet

Purified water	62.81 mass %
Anhydrous ethyl alcohol	35
10 Polyoxyethylene hydrogenated castor	0.1
Citric acid (food)	0.02
Sodium citrate	0.06
Antibacterial zeolite B	2
Trisodium ethylenediaminehydroxyethyl triacetate	
15	0.01

## [0075]

[Effects of the invention]

The present invention can provide an endermic liniment containing antibacterial zeolite

20 that exhibits the effect of preventing discoloration of the endermic liniments and/or reducing the degree of discoloration.

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[Document title] Abstract

[Abstract]

[Object] The object is to provide an endermic  
liniment containing antibacterial zeolite that  
5 exhibits the effect of preventing discoloration of  
the endermic liniments and/or reducing the degree  
of discoloration.

[Means to achieve the object] An endermic  
liniment comprising antibacterial zeolite and  
10 trisalt ethylenediaminehydroxyethyl triacetate.

[Selected drawings] None